(2)

An Examination Of Naval Surface Fires In Support Of Future Amphibious Operations

A Monograph
by

Lieutenant Commander John G. R. Wilson, USN
Surface Warfare

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

First Term AY 91-92

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	12/12/91	MONOGRAPH

4. TITLE AND SUBTITLE
AN EXAMINATION OF NAVAL SURFACE FIRES IN SUPPORT OF FUTURE AMPHIBIOUS OPERATIONS (U)

5. FUNDING NUMBERS

6. AUTHOR(S)
LCDR JOHN G. R. WILSON, USN, SURFACE WARFARE

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
SCHOOL OF ADVANCED MILITARY STUDIES
ATTN: ATZL-SWV
FORT LEAVENWORTH, KANSAS 66027-6900
COMM (913) 684-3437 AVON 552-3437

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

S[redacted]

14. SUBJECT TERMS			15. NUMBER OF PAGES
SHORE BOMBARDMENT	AMPHBIOUS WARFARE		63
NAVAL SURFACE FIRE SUPPORT	AMPHIBIOUS OPERATIONS		16. PRICE CODE
NAVAL GUNFIRE SUPPORT	LANDING OPERATIONS		
NAVAL GUNS/GUNFIRE/GUNNERY	CRUISE MISSILES		

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNLIMITED

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

LCDR John G. R. Wilson, USN

Title of Monograph: An Examination of Naval Surface Fires in Support of Future Amphibious Assault Operations

Approved by:

Robert H. Berlin
Dr. Robert H. Berlin, Ph.D. — Monograph Director

James R McDonough
COL James R. McDonough, MS — Director, School of Advanced Military Studies

Philip J. Brookes
Dr. Philip J. Brookes, Ph.D. — Director, Graduate Degree Program

Accepted this 31st day of December 1991

ABSTRACT

AN EXAMINATION OF NAVAL SURFACE FIRES IN SUPPORT OF FUTURE AMPHIBIOUS ASSAULT OPERATIONS by LCDR John G. R. Wilson, USN, Surface Warfare, 63 pages.

The conduct of amphibious warfare has evolved since World War II. Evolution of warfare has transformed the style of amphibious operations from attrition to that of maneuver. Transformation of amphibious warfare encouraged the development of the amphibious over-the-horizon assault technique, a procedure which requires new technological innovations for its successful execution. To determine if sufficient fire support assets exist to support this form of modern warfare, this monograph examines the doctrines of amphibious warfare and naval surface fire support.

This work initially examines and establishes the utility of amphibious warfare using evidence and principles espoused by the classical military, naval, and maritime theorists. Next, three historical examples are examined to demonstrate the validity of current amphibious warfare and fire support doctrine. Then, current doctrine is presented. Finally, the current and future elements of naval surface fire support are examined to determine whether sufficient assets exist to support over-the-horizon amphibious support operations. This analysis is conducted using the criteria of "necessary and sufficient," "suitable, feasible, and acceptable," and "affordable."

Based on the analysis conducted, current naval surface fire support assets are capable of supporting over-the-horizon assault operations if sufficient planning time is provided to adequately develop and refine the individual cruise missile missions. This planning system, as currently configured, is awkward and not capable of responding to emergent battlefield requirements and extenuating circumstances. This planning system requires an upgrade to reduce the required planning time to construct and implement fire support and make fires more responsive in the support of the landing force commander.

TABLE OF CONTENTS

INTRODUCTION

The practice of amphibious warfare dates to around 1250 B.C.[1] "The 'face which launched a thousand ships' from Mycenae to Troy also launched an invasion of 100,000 men, a full-scale [opposed] beach landing, and the successful recovery of a defined objective: Helen herself."[2] Thucydides recognized the difficulties posed by an amphibious operation when in 425 B.C. he noted that:

> Athenians . . . who know from experience all about landing from ships on foreign shores and how impossible it is to force a landing if the defenders stand firm and do not give way through fear of the surf or the frightening appearance of the ships as they sail in . . . .[3]

More recently, the eighteenth century Englishman Thomas M. Molyneux identified the continued value of this style of warfare when he observed that an amphibious operation, when carefully prepared and executed with surprise, "comes like thunder and lightning to some unprepared part of the world."[4] The maintenance of an amphibious capability remains important to this day when one examines a globe and recognizes that:

> with a few exceptions (such as the United States [and the Soviet Union]), the bulk of capital wealth, technological fabric, and urban population centers are located within 50 miles of seas and oceans. In fact, nearly half of the world's man-made assets are found within 20 miles of its beaches.[5]

As a maritime nation, the United States regards the sea as an asset to those nations able to exploit its advantages. The sea lines of communication that the nineteenth century American naval theorist Captain Alfred Thayer Mahan emphasized in his works remain a touchstone for our modern

naval forces. Afloat Marine amphibious forces represent a most ready and responsive aspect of our nations forced entry capability. This ability represents an impressive threat when one considers the area of a coast made vulnerable by the presence of an amphibious task force. Such a force "400 nautical miles off the East coast of the United States, as an example, could threaten a 1000 mile coastline extending from New York City to Cape Canaveral within a 24-hour period."[6]

Opponents of amphibious warfare, however, argue that it is an anachronism. They propose the lack of a combat amphibious landing since the Inchon assault during the Korean Conflict as evidence of its demise, even though "the absence of large-scale amphibious operations may be testimony to the Marine Corps' very capacity to conduct them."[7] This controversial debate pits:

> the Navy's view of maritime strategy primarily against the extreme continentalist school—those who would subordinate most other strategic considerations to land defense of Western Europe.[8]

With the apparent easing of the threat in Europe, the Secretary of the Navy states that "we must shift the objective of our national security strategy from containing the Soviet Union to maintaining global stability."[9] Thus, the traditional bi-polar nature of world stability has shifted to a multi-polar situation in the wake of Soviet disintegration. The resultant power vacuum has encouraged regional powers, freed from the yoke of superpower restraint, to "grasp the opportunity to assert themselves over their less powerful

neighbors to enhance their wealth and prestige."[10] The recent Iraqi aggression in Kuwait is evidence of this premise.

To curb acts of this nature, President Bush outlined future U. S. defense policy based on the major elements of deterrence, forward presence, and crisis response.[11] Deterrence represents the cornerstone of this policy and mandates that a sufficient and credible force dissuade potential adversaries from contemplated aggression against U. S. national interests.[12] Amphibious warfare has a significant deterrent value. This worth is derived from the ability to demonstrate national political and military will in close proximity to adversarial nations, without the actual irreversible commitment of military force.[13] The inherent mobility of amphibious forces makes them flexible and versatile. The "ability to launch a tactical landing force from the seaward flank, [represents] an attractive component of [the] maritime capability."[14]

The amphibious warfare capability of the United States supports this policy of deterrence and the military strategic concepts of forward presence and crisis response.[15] This warfare skill may not, however, offer as attractive an option now as it has in the past. Proliferation of precision-guided anti-ship weapons represents a threat to amphibious shipping. Many nations also possess access to near-real-time information and intelligence gathering assets. The potential to acquire and kill amphibious ships prior to the initiation

of an assault questions the feasibility of future landings of this type.[16] It must be noted, however, that "no potential adversary of the United States has the military wherewithal to defend every mile of national coastline."[17] Providing that an enemy nation possesses a large coastline, the mobility of an amphibious force maintains the element of surprise. This element is necessary if an amphibious force is to avoid detection and destruction by sophisticated systems.[18]

This nation invests heavily to maintain its amphibious capability. Although the number of ships in commission will decline from 559 to 476 between 1987 and 1992, the number of amphibious ships will decline at a lesser rate from 64 to 62. Between fiscal years 1991 and 1993, the Navy intends to procure 88 Marine Corps aircraft, 24 Landing Crafts Air-cushioned (LCACs), and 4 ships to support this amphibious capability. The Navy further intends to spend nearly $37.5 billion dollars on Marine Corps operations during fiscal years 1990 to 1993.[19] Thus, Congress and the Navy remain committed to an amphibious assault capability. Whether or not this is a wise choice remains the subject of heated debate. A retired Marine colonel recently stated that "one either accepts the premises of the maritime strategy and its corollary long-term requirement for an amphibious capability, or one does not."[20]

The purpose of this monograph, then, is not to debate the feasibility of amphibious warfare, but rather to accept

its conduct as a mission for the Navy, examine its likely conduct, and comment on the manner in which surface naval fire support can buttress these amphibious ventures. The basic research question addressed is: Are current naval surface fires sufficient to support future opposed amphibious assault operations?

The methodology used to answer this question involves an examination of the theoretical foundations of amphibious warfare. Additionally, historical examples of amphibious operations will be reviewed to shed light on the importance of naval surface fire support in past amphibious operations. The evolution of current and future amphibious warfare and its associated naval surface fire support doctrine will be considered. The capability to support amphibious warfare with naval surface fire support will be scrutinized. These examinations will be conducted using the criteria of "necessary and sufficient," "suitable, feasible and acceptable," and "affordable." Finally, conclusions will be drawn and the monograph will be completed with a discussion of implications for future amphibious operations.

THEORETICAL FOUNDATIONS

The "classical" theorists wrote little about amphibious operations and their support. Collectively, their work provides a foundation for the understanding of the conduct of modern warfare, including amphibious operations. Although none of these theorists witnessed such an operation, the

military thinkers Clausewitz and Jomini lived during a period in which a major amphibious assault was contemplated.

Sun Tzu, a Chinese theorist who wrote between 400 and 320 B.C.,[21] noted many of the foundations of warfare. His premise that "all warfare is based on deception"[22] was complemented by his exhortation to "attack where he is unprepared; sally out when he does not expect you."[23] This combination of the principles of deception and surprise were suggested by Sun Tzu to encourage exploitation of defensive weaknesses. The Iraqi scheme during the Gulf War illustrated inherent weaknesses identified by Sun Tzu centuries earlier. He cautioned that:

> if he prepares to the front his rear will be weak, and if to the rear, his front will be fragile. If he prepares to the left, his right will be vulnerable and if to the right, there will be few on his left. And when he prepares everywhere he will be weak everywhere.[24]

Weaknesses, however, cannot be exploited without the assistance of information and intelligence.

Knowledge of defensive arrangements is critical to the execution of an offensive operation. Sun Tzu warned:

> know the enemy and know yourself; in a hundred battles you will never be in peril. When you are ignorant of the enemy but know yourself, your chances of winning or losing are equal. If ignorant both of your enemy and of yourself, you are certain in every battle to be in peril.[25]

Of perhaps greater importance than intelligence in the conduct of offensive operations is the principle of speed.

Combined with surprise, Sun Tzu explained that "speed is the essence of war. Take advantage of the enemy's

unpreparedness; travel by unexpected routes and strike him where he has taken no precautions."[26] Commanders should consider the concern Sun Tzu illuminated when he cautioned that "invincibility lies in the defense; the possibility of victory in the attack."[27]

The nineteenth century German Karl von Clausewitz agreed. Clausewitz believed that "defense is the stronger form of waging war."[28] To overcome this strength, Sun Tzu championed the application of maneuver through the use of "the extraordinary and the normal forces. The force which confronts the enemy is normal; that which goes to his flanks the extraordinary."[29] Sun Tzu also recognized that maneuver is not the commander's panacea. He forewarned that "nothing is more difficult than the art of maneuver . . . both advantage and danger are inherent."[30]

The nineteenth century Frenchman Antoine Henri Jomini, a contemporary of Clausewitz, was influenced by Sun Tzu's analyses. The first of modern theorists to write about amphibious operations, Jomini termed them "descents." He examined the only amphibious operation contemplated during his life, Napoleon's proposed invasion of England.[31] Jomini noted the challenge of amphibious operations, and believed that all other maritime expeditions represented lesser challenges. He saw Napoleon's failure to execute this planned landing in England as a great loss to posterity.[32]

Nevertheless Jomini, in the absence of example for the conduct of successful amphibious operations, examined the problem and offered guidance. Jomini agreed with Sun Tzu on the importance of deception and surprise,[33] and he understood the impact of firepower and the effects of fires from naval guns on the conduct of amphibious operations.[34]

Jomini recognized the difficulty of getting an amphibious assault force ashore. Modern commanders, faced with the same dilemma, have sought to apply the principle which Jomini believed to be the most paramount in war, the principle of mass. Jomini believed the principle fundamental to all operations of war was to throw the mass of an army on the "decisive points" in a theater.

Jomini defined "decisive points" as "points the possession of which would give the control of . . . the center of the chief lines of communication in a country,"[35] and fully recognized that their identification represented a challenge. If these points could be identified, Jomini felt that the art of war consisted of constructing a "line of operations" through these points. The construction of a plan to support this "line" was fundamental to campaign planning.[36]

Therefore, the correct choice of landing site in an amphibious operation depends on choosing a position that gives one advantage over a decisive point or a line that links decisive points. Jomini, however, determined that this choice was not sufficient to ensure victory. He believed the

morale of the armies and nations were of paramount importance and the ingredients which made victories decisive. Jomini concluded his argument with the belief that the attacker possessed the moral advantage over the defender.[37] Thus, while theorists argued that defense was the stronger form of war, the uncertainty of landing site location and timing of the attack gave the attacker a possible advantage to exploit.

These thoughts, however, failed to link land and naval warfare theory. This shortfall became evident when the nineteenth century American theorist Alfred Thayer Mahan wrote of war at sea. Mahan's theory represented a separate thought pattern, and viewed naval and land warfares as unrelated and distinctly separate disciplines of war.[38]

The twentieth century theorist Sir Julian Corbett attempted to correct this disparity and clarified the relationship of naval and land forces. Like Jomini, Corbett was concerned with lines of operations, but he contradicted Mahan's purely naval thought. Instead, he proposed that no separation be drawn between army and naval operations.

He regarded the fleet and army as a single force, the action of which should be coordinated in purpose to achieve a united goal. Corbett, unlike Mahan, subverted naval strategy as a part of a larger maritime strategy. This maritime strategy determined the movements of the fleet in relation to the actions of land forces. Corbett encouraged coordination

because he determined that it was impossible for sea power alone to decide the outcome of any war.[39] He realized:

> since men live upon the land and not upon the sea, great issues between nations at war have always been decided—except in the rarest cases—either by what your army can do against your enemy's territory and national life or else by the fear of what the fleet makes it possible for your army to do.[40]

Like Jomini, Corbett considered elements of the war plan essential. Rather than specifically address the importance of the lines of operations, Corbett generalized and professed that the paramount concern of maritime strategy was to determine the mutual relations of a nation's army and navy in a war plan. Corbett echoed Clausewitz that the war reflect the aim of political policy.[41]

Corbett further borrowed from Clausewitz in his examination of the various forms of war and found that offense and defense are mutually complementary.[42] Amphibious operations exhibit the synthesis of different aspects of warfare. The amphibious commander, in attempting to bring combat power to bear on the defender, is concurrently protecting or defending his force to preserve combat power. Like Sun Tzu, Corbett advocated deception and surprise and maintained that the advantage was usually secured by the side which seized the initiative, either by dexterity or stealth.[43]

Corbett provided an outstanding example of deception and uncertainty. Unsure of a threatened English invasion, Napoleon ordered his Conscription Director:

to work out a scheme for providing a permanent force of no

> less than 300,000 men from the National Guard to defend the French coasts. "With 30,000 men in transport [ships] at the Downs," the Emperor wrote, "the English can paralyze 300,000 of my army."[44]

Thus, the threat of an amphibious assault force fixed a defensive army ten times its size. Although amphibious forces may not always fix large land armies, the same situation occurred in the Gulf War. An afloat Marine Expeditionary Brigade fixed either ten or eleven Iraqi Divisions along the Kuwaiti Coast.[45] In addition to identifying a strategy relevant to this day, Corbett defined the maritime war phases as: first, seize the territorial objective; second, force an attenuated offensive on the enemy; finally, return to the tactical offensive to force the enemy to accept the situation.[46]

Thus, Corbett delineated the manner in which army and naval forces are integrated to achieve a common goal. The mid-twentieth century theorist and Naval War College consultant Herbert Rosinski studied theory and proposed to restrict this combined influence, choosing to define the limit of sea power's capacity to impose in land struggles as the maximum range of naval gunnery.[47] More recently, Colonel John Warden, USAF, a National War College student, recognized the potential of new technologies and loosened this limit.

Warden allowed more flexibility, stating that "the theater commander must determine whether he can best attain his objective with air, sea, or land forces."[48] Warden, however, would limit the assets available to a commander.

Like the early air theorist Douhet, Warden believes that air superiority is the number one goal of all forces.[49] Warden defines air superiority as "having sufficient control of the air to make air attacks on the enemy without serious opposition and . . . incursions."[50] Warden states that "if air superiority is accepted as the first goal, then clearly all operations must be subordinated to its attainment."[51]

Warden, therefore, might limit the air assets available to a commander conducting an assault concurrent with major air operations. In doing so, Warden would force this commander to rely on other forms of fires to support the operation. If one accepts that the goal of air superiority applies to carrier-based aviation, as well as land-based assets, then naval surface fires take on increased importance in their contribution to amphibious assault operations.

HISTORICAL EXAMINATIONS

An example of amphibious warfare, the landing at Gallipoli in World War I gave credence to the premise that "of all the operations in war, historically the most difficult and dangerous has been to mount an assault from the sea."[52] An examination of this landing illustrates the employment of fires in support of amphibious operations.

This operation was designed to remove pressure on the stalemated Western Front and support Russian allies by threatening Entente forces on a front perceived as vulnerable by Allied leaders. Great expectations were placed on the

ability of a force to quickly gain success by bombarding Constantinople and knocking Turkey out of the war. This reasoning was encouraged by earlier:

> achievements of heavy howitzer against the forts of Liege and Namur [in Belgium] were generally believed by [British] ministers to presage the success of modern naval gunfire—especially the new 15-inch guns—against the antiquated works at the Dardanelles. Above all it was felt that no great harm would be done, even if the operation failed. If satisfactory progress [was] not made, the bombardment could be broken off and the fleet could steam away.[53]

Unfortunately, this operation failed to force the Dardanelles and alerted the opposition.[54] Sir Winston Churchill, the First Lord of the Admiralty, remained optimistic and became convinced that an assault of the Gallipoli Peninsula was possible. It was later charged that Churchill erred and "over-estimated the value of naval guns with low trajectory against land defenses."[55]

This over-estimate resulted from the belief that the new 15-inch guns would be more effective than past systems, because they represented, to this time, the largest guns ever made. The value of these systems, however, "in support of the army ashore . . . was proved a disappointment."[56] The British belief in the decisive nature of a bombardment was unfounded. It was determined that:

> a bombardment of the beach defenses by flat-trajectory guns—especially when the defenses cannot be accurately located beforehand—can in no way be compared in effect with the preliminary bombardment and barrage fire of land operations. The naval shells are not man-killing projectiles.[57]

These guns and projectiles were designed and constructed to defeat the heavy armor of other battleships. Thus, these systems were employed at Gallipoli in a manner for which they were not designed. The bombardments that preceded the landings did not accomplish the desired results because:

> the guns [were of high velocity and] flat trajectory, only fired [armored piercing] shells that were inefficient against defiladed infantry positions, so that the assailants ran up against the defenders, whose resistance remained intact.[58]

In addition to the problems of unsuitable weapons and ordnance, command and control problems prevented the landing force from maximizing the naval fire support assets available, as "both the army and navy in these early days had everything to learn with regard to the best means of directing and controlling naval fire on shore targets."[59] Communications of fire support missions was a major obstacle. The British navy had planned to communicate with army personnel ashore via visual signals, radios, and aircraft. As the situation developed, this planning proved futile because, except in emergencies, naval radios were not available to answer calls for fire. For the majority of this operation, then, the only form of reliable ship-to-shore communications became messengers. Their transport was provided by steam launch, and the limited numbers and unreliability of these vessels exacerbated the command and control difficulties encountered.[60]

Other expedients adopted to ensure adequate naval surface fire support worked well and remain in use today. Map locations were referenced to a common grid system to ensure communication of desires, and naval units were authorized to fire on Turkish troops or guns clearly visible. Despite these arrangements, fire support was still cumbersome. It was not unusual to experience fire support delays of over an hour between the placement of requests and the delivery of ordnance on target were common.[61]

Even if naval surface fire support was obtained, its effect was neither devastating nor lasting. Positions bought under fire were often reoccupied after the bombardment was lifted.[62] The effects of naval surface fires were limited against prepared positions. General Sir Ian Hamilton, the landing force commander, frustratedly exclaimed, "the shots from our naval guns, smashing as their impact appears, might as well be confetti for all the effect they have. . . ."[63]

This fire support, however, initially had a significant moral effect on the opposing troops. Once the enemy became aware of the limited effect armor-piercing projectiles had on prepared defenses, this effect ceased. The Allied soldiers still continued to appreciate the sound of the projectiles overhead, and mistakenly believed they badly hurt the Turks.[64]

Conversely, Allied soldiers suffered under the strain of enemy machine guns and the defensive trench systems once stalemate occurred. These enemy defenses represented a

difficult obstacle. Hard to discern, even by observation balloons, their construction was such that the ship's flat-trajectory armor-piercing rounds had little or no effect.[65]

On exposed troops, however, naval surface fire support was coordinated and effective in several instances. The battleship *Albion* "effectively stopped [an enemy] counter-attack [and] the incident undoubtedly had much to do with the delay on the remainder [of the] French front."[66] Other attacks by massed troops were disrupted by supporting ships.[67] One incident represented a watershed for the landing. A counterattack was broken, and:

> this incident, plainly visible to the Turks in other portions of the line, had a marked effect. For over three months, the Turks made no further attempt at Anzac [beach] by daylight over ground that was in direct view of the supporting ships.[68]

Fire support, however, was not a panacea for this or other assaults of the period. In a manner similar to the Somme offensive, once stalemate occurred, fire support was neither capable of reducing an entrenched enemy nor able to guarantee the advance of infantry. Additionally, shortages reduced the amount of ordnance available. Long lines of communication from Europe to the Aegean Sea exacerbated the hardship. As a result, the shells expended in support of the landing diminished:

> 26-28 April (D+1 to D+3); 14,444 rounds fired.
> 05-09 May (D+10 to D+14); 3,489 rounds fired.

This decline contributed to the demise of Allied morale and eased the strain on the enemy. Although a real problem,

logistic constraints were not the cause of fire support termination. The recent sinking of the *Lusitania* raised concerns over the menace offered by enemy submarines.[69]

These fears were justified, for it was the German submarine threat that led to the cessation of fire support. The German submarine *U-21* sank the British battleship *Triumph* off the Gallipoli Peninsula. The British fleet commander:

> at once ordered all his capital ships to withdrawal to the safety of Murdos Harbor [a Greek Island removed from the landing sites], save for the old battleship *Majestic*, which remained with the destroyer off [the Gallipoli Peninsula], until she too was sunk by *U-21*.[70]

After further stagnation, the Allies accepted failure and withdrew. Following the end of World War I, "the history of the Gallipoli debacle became a textbook example and convinced most staff planners that any daylight assault against a defended shore was impossible."[71] These planners believed that it was easy to defeat this style of attack at the shoreline, because the amphibious landing process was too slow and the landing force too exposed to defending fires.

The United States Navy lacked the luxury of dismissing the amphibious warfare option. The Japanese threat in the Pacific between World Wars I and II was credible. As such, the Pacific war plan required forces to seize airfields to defeat predicted early Japanese gains in a Pacific conflict, which many planners regarded as inevitable.[72] Thus, the Navy and Marine Corps team expended much effort and expense during the 1920s and 1930s studying Gallipoli, developing amphibious

doctrine, and practicing landings. These extensive efforts resulted in the 1934 publication of the Tentative Landing Operations Manual. This document:

> outlined six major operations as being essential [to the conduct of amphibious operations]: (1) command relationships; (2) naval gunfire support; (3) aerial support; (4) ship-to-shore movement; (5) securing the beachhead; and (6) logistics.[73]

The doctrine addressed the issues of naval gunfire support feasibility, fire control coordination and communications, and provided solutions for their conduct.[74] These solutions were demonstrated and refined the numerous amphibious operations conducted in World War II. So effective was the developed technique that Lieutenant General Kuribayashi, commander of the Japanese forces at Iwo Jima, informed his superiors that:

> however firm and stout pillboxes you may build at the beach, they will be destroyed by bombardment of [the] main armament of the battleships. Power of the American warships and aircraft makes every landing operation possible to whatever beachhead they like.[75]

Though successful, these Pacific amphibious operations of the United States were characterized by heavy loss of life by both the landing force Marines and their ship-based naval support units. This support shipping presented a lucrative target and was the subject of intensive attack from enemy sea and air platforms.

The amphibious operations at Leyte and Okinawa toward the end of World War II introduced a new challenge to the survival of these ships. It appeared in the form of suicide

attacks from the sky on 01 November 1944. Of six ships that suffered suicide crashes that day, four crashes were probably deliberate *kamikaze* or *oka* attacks.[76] Although ships suffered air attacks throughout the war, this threat was more menacing because the damage inflicted by the crashed aircraft caused greater destruction than bombs or torpedoes.

The number of suicide attacks peaked during operations at Okinawa. Between 26 March and 07 June 1945, 368 ships were damaged in this manner.[77] Approximately 7,830 aircraft were sacrificed by the Japanese,[78] but the realized return was significant. Even though the U. S. possessed air superiority and picket destroyers were deployed to provide warning, battle damage forced five of eleven *Essex*-class carriers to withdraw.[79] Concern over *kamikaze* attacks was great, and Admiral Spruance reported to Admiral Nimitz:

> the skill and effectiveness of enemy suicide air attacks and the rate of loss and damage to ships are such that all available means should be employed to prevent further attacks. Recommend all available attacks with all available planes. . . .[80]

Nimitz concurred, but despite the increased effort to defeat this threat, the Navy's *kamikaze*-inflicted casualties during the Okinawa campaign were significant. Naval losses represented 39% killed and 13% wounded of the total American battle casualties suffered in this campaign.[81] Great effort was expended, but the Navy was never able to defeat this threat, and suffered losses accordingly.

Thus, the Navy concluded its action in World War II with an operation that demanded a respect from ships engaged in fire support operations. Bombardments telegraphed the arrival of an assault and forewarned the defender. The longer the bombardment, the greater the warning. Loss of surprise allowed the defender reaction time to plan for a counter-attack of the assaulting force. The predicament of sufficient bombardment versus too much warning troubled many amphibious warriors. Consideration for this dilemma would play greatly in planning for the next major amphibious assault performed by the Navy and Marine Corps team. This operation at Inchon during the Korean Conflict reemphasized one of the lessons learned in previous landings; the importance of surprise in amphibious operations.

The assault at Inchon, Korea in September, 1950 absorbed the lesson of surprise and represented a transition in amphibious warfare. Although demonstrated during the landing at Tinian during World War II where "maneuver warfare and surprise, not brute force, gave the Marines their most effective landing of the war,"[82] this technique represented the exception, rather than the rule, during World War II.

Inchon manifested the departure of amphibious operations from warfare based upon attrition. Although still an attack of a defending enemy, Inchon was based on surprise and maneuver versus overwhelming firepower and attrition. General MacArthur desired an:

> amphibious landing of a two-division corps in rear of enemy lines for [the]purpose of enveloping and destroying enemy forces in conjunction with [a land] attack from [the] south by [the] Eighth Army. I am firmly convinced early and strong effort behind his front will sever his main lines of communication and enable us to deliver a decisive and crushing blow. . . . The alternative is a frontal attack which can only result in a protracted and expensive campaign.[83]

MacArthur reasoned that the bulk of the enemy's combat power was committed against forces within the Pusan perimeter. Although a frontal attack to break out of the perimeter was possible, he predicted it would cause one hundred thousand Allied casualties. MacArthur believed that "the North Koreans were unprepared for an enveloping attack, least of all at such a place as Inchon."[84]

Many detracted from the concept of a landing at Inchon, however. Members of the Joint Chiefs of Staff found the suggested landing a gamble, but MacArthur considered their arguments and decided in favor of an assault. He believed that "the amphbious landing is the most powerful tool we have."[85] MacArthur further felt that the landing must be conducted deep in the enemy rear to be effective, a belief deeply rooted in his personal theory of warfare. MacArthur perceived that:

> the deep envelopment, based on surprise, which severs the enemy supply lines, is and always has been the most decisive maneuver of war. A short envelopment, which fails to envelop and leaves the enemy's supply system intact, merely divides your own forces and can lead to heavy loss and even jeopardy.[86]

The real question remained not the type of operation desired, but rather how to support it. The gunfire support

officer strenuously objected to Inchon as the landing site. He prepared a list of all possible obstructions to the conduct of a landing; Inchon possessed all of the undesirable characteristics.[87] Perhaps for this reason, MacArthur chose Inchon. He reasoned that the enemy commander would also analyze the problem and determine that no force would consider landing at such an inhospitable location.[88]

Due to the restricted nature of the channel approach to Inchon, no cruisers or battleships could risk entering the harbor to provide support. If such a vessel grounded, the channel would be blocked and the landing complicated or terminated. Thus, the only naval surface fire support employed were three medium-rocket-landing-ships and six destroyers armed with 5-inch naval guns. The destroyers anchored in the channel and brought the island that dominated the landing area under fire. The plan called for two separate fire support periods of one hour duration; the fire support ships did not remain in the harbor during low tide because of the probability of grounding or stranding.[89]

During the first period, the six destroyers fired 998 rounds and succeeded in silencing enemy gun positions, but not without loss. Three of the destroyers were hit by anti-tank fire from the beach, but suffered only superficial damage and one death.[90]

A damaged ship was removed from action and five destroyers returned on the next tide for the second support

period. The destroyers received no fire while they bombarded their targets for forty minutes. These ships fired 1732 rounds during seventy-five minutes of action and silenced all opposition.[91]

The following morning the assault was made under the direct support of the medium-rocket-landing-ships. Naval fires supported the landing by destroying heavy weapons that could have damaged or destroyed amphibious shipping as it approached the landing site. "D-Day operations were completed on schedule with all objectives taken, at a cost of but 21 killed and 175 wounded."[92] Marking the transition of amphibious operations from attrition to maneuver warfare, MacArthur showed that:

> amphibious warfare in not simply the delivery of troops ashore administratively, but the prosecution of land operations using the seaward flank, with all the attendant advantages of mobility, surprise, and the scope for ingenuity and variation.[93]

DOCTRINE

An amphibious assault is defined by joint doctrine as "an attack launched from the sea by naval and landing forces embarked in ships or craft involving a landing on a hostile shore."[94] This doctrine states that this assault represents the principle type amphibious operation.[95] Marine Corps doctrine for the conduct of these assaults has evolved to reflect the lessons of the past and is based on maneuver. Doctrine for this maneuver warfare now professes the

complementary and dependent nature of fire and maneuver and separates maneuver from attrition as a difference in style.[96]

This style differs in that maneuver stems from a desire to get around a problem and attack it from positional advantage, rather than smash it frontally through attrition. Maneuver warfare is a "philosophy that seeks to shatter the enemy's cohesion through a series of rapid, violent, and unexpected actions. . . ."[97] To accomplish this goal, the aim of maneuver is "to render the enemy incapable of resisting by shattering his moral and physical cohesion . . . rather than to destroy him physically through incremental attrition."[98]

The Marine Corps' emerging view of maneuver warfare is embodied in the concept of over-the-horizon amphibious assault. This concept represents the evolution from attrition to maneuver warfare because it accepts the realities of modern warfare and the proliferation of sophisticated technology.[99] Sophisticated threats to amphibious warfare exist in many forms, including detection and tracking by over-head surveillance systems. Third-world nations possess access to this information, furnished by other governments or private corporations.[100]

The requirement to launch an assault from distance has evolved in response to the ranges and accuracy of sophisticated anti-ship systems.[101] Many first- and second-world countries currently possess such systems. The Marine Corps suggests that, by the turn of the century, assaults

against twelve potential third-world opponents would require an assault from over-the-horizon due to these dangers.[102] Marine Corps Officers suggest that:

> in a MAF-sized assault, this translates into a tactical mobility requirement to land the assault elements of 2 regimental landing teams in 90 minutes over a ship-to-shore distance of 50 nautical miles, in either a 2/3-by-air 1/3-by-surface mode, or the reverse.[103]

Combined with the perceived requirement to support a Marine Amphibious Force / Amphibious Task Force assault landing with up to forty-seven fire support ships and six carriers, these requirements pose many unanswered questions for amphibious warriors to ponder.[104] One issue regards the fire support of such an operation from over-the-horizon, because the Marine Corps desires that suppressive firepower effects support their maneuver.[105] The Marine Corps proposes that:

> the aim is not an unfocused application of firepower for the purpose of incrementally reducing the enemy's physical strength. Rather, it is the *selective* application of firepower in support of maneuver to contribute to the enemy's shock and moral disruption. The greatest value of firepower is not physical destruction—the cumulative effects of which are felt only slowly—but the moral dislocation it causes.[106]

The Marine Corps does not advocate attrition through firepower, but rather maneuver to facilitate the concentration of strength against *critical* enemy decisive points. Rather than the bombardments of World War II-era landings, the Marine Corps advocates selective destruction of key enemy assets, because they place greater importance in the potential of surprise. In theory, Navy doctrine

supports this Marine Corps concept of over-the-horizon amphibious assault.[107]

Current naval doctrine is derived from joint direction which identifies these fires as a supporting arm in amphibious operations. This doctrine maintains that "fires are delivered to destroy or neutralize defenses capable of opposing landing and subsequent operations ashore."[108] These fires must be coordinated with those of aircraft and artillery to ensure conservation of assets and safety. This coordination is based on application of the following principles:

-Avoid unnecessary duplication of missions.
-Do not unduly endanger friendlies during mission execution.
-Minimize interference between different means of support.
-Employ each means of support on missions best suited and consistent with its capabilities.
-Control fires at lowest echelon capable of adequately performing this function.
-Maintain a common system of target designation.

All naval surface fire support coordination within the task force is conducted by a Supporting Arms Coordination Center (SACC) located on the commander's flagship. Planning of fires is based on the following requirements:

-Sufficient ships and spotting assets assigned.
-Sufficient quantities and types of munitions available.
-Adequate sea room and suitable hydrographic conditions for safe maneuver of ships.
-Maintenance of local sea superiority.
-Positive observation of fire support target areas.
-Separate communication circuits for coordination.
-Sufficient time to effect essential destructive fires.
-Complete integration of naval surface fire support with landing force scheme of maneuver.[109]

These requirements are considered by the amphibious task force commander, who is that officer "responsible for the preparation of the fire support plan, based on the support requirements presented by the landing force commander, and on [other] naval requirements."[110] Requirements for support are:

> screened, reconciled, and consolidated at each echelon through which the requests pass. At the landing force level, after final screening and coordination, the requests are collated and constitute the consolidated naval [surface] fire request. This consolidated request is submitted . . . to the amphibious task force commander. On the basis of this consolidated request and the availability of fire support means, daily assignments best suited to meet the landing force requirements are made by the amphibious task force commander.[111]

Assignment of means constitutes the naval surface fire support plan. This plan is divided into pre-d-day, d-day, and post-d-day naval surface fire support plans. These plans support the conduct of *close supporting fires* in support of the landing and *deep supporting interdiction fires*. These fires are provided by ships in either *direct support* of a battalion-sized unit, or *general support* of a regimental-sized unit or larger. The procedures for the coordination and conduct of naval surface fire support are addressed in Naval Warfare Publication 22-2(Rev. B), Supporting Arms in Amphibious Operations.[112]

NAVAL SURFACE FIRE SUPPORT: PRESENT AND FUTURE

Present naval surface fire support can be broken down into several parts: weapons and equipment; target acquisition assets; command, control, and communications.[113]

To understand the capabilities of naval surface fire support, it is useful to examine each of these parts.

WEAPONS SYSTEMS

The following missile systems are currently available in the fleet inventory to provide naval surface fire support:

Name	Nomenclature	Warhead/Payload	Range	Platform
Tomahawk	BGM-109C BGM-109D	Conventional Unitary or Submunitions	700nm	Various Ships or Submarines[114]
Harpoon	SLAM	Conventional Unknown	70nm	Various Ships[115]

Tomahawk is a "shoot and forget" precision weapon, while Harpoon(SLAM) requires guidance from an A-6 bomber or SH-60B anti-submarine helicopter.[116]

The following list represents those gun systems available to provide naval surface fire support:

Name	Nomenclature	Payload	Range	Rate of Fire Rounds/Minute
16-inch	16/50Mk7	1900lb (HE) 2700lb (AP)	39,046m	2 2
5-inch	5/45Mk54 5/45Mk42 5/38Mk28 5/30Mk30	73.8lb (HE) 73.8lb (HE) 73.8lb (HE) 73.8lb (HE)	24,000m 23,000m 16,000m 23,600m	20[117] 26 25 24[118]

Although not listed here, the 76mm OTO Melara gun installed in *Oliver Hazard Perry*-Class Frigates is capable of providing self-protection. The lack of an optical sight in the fire control system and range limitations[119] of the system prevent this ship-class from conducting gunfire support.[120]

Several of the above will not be available to support operations in the future. The *Iowa*-Class Battleships are

being decommissioned. Whether their 16-inch/50calMk7 and 5-inch/38calMk28 systems will remain in the inactive fleet for reactivation is the subject of debate.[121]

An examination of these weapons' range capabilities highlights the limited assets available to provide naval surface fires in support of over-the-horizon amphibious assaults. No current guns possess the characteristics necessary to range the shore from over-the-horizon.

The Marine Corps considers this limitation of sufficient importance to issue a point paper proclaiming that "the long range NSFS requirement remains unfulfilled" and that "with the planned retirement of the two remaining battleships, the Navy's ability to provide all weather, around-the-clock intermediate range NSFS will be lost."[122] What this point paper fails to examine is whether such support is "necessary and sufficient," "suitable, feasible, and acceptable," and "affordable."

Based on a 1985 "Naval Surface Fire Support Study," this paper delineates a NECESSARY need:

> to support over-the-horizon (OTH) amphibious assault operations [with a required] all weather, around-the-clock long range NSFS capable of [ranging targets] up to 60 nautical miles.[123]

Assuming that this requirement is both required and NECESSARY, this "indispensable and essential"[124] need is fulfilled by both the Tomahawk and Harpoon(SLAM-variant) land attack missiles, which both satisfy the requirement. Additionally, these systems provide an increase in firepower

volume, expanding the ships capable of providing deep fires to more than 200 platforms.[125] Therefore, these missiles are SUFFICIENT to meet the requirement in that they are "enough to meet the needs of a situation or proposed end"[126] in terms of both range and firepower. The SUFFICIENCY of these systems is demonstrated in the quantum leap threat that Tomahawk provides by the increased scope of enemy facilities it places at risk when compared with conventional gun systems.[127] This capability is best exploited in the third-world nations. Due to their austere infra-structures, the number of critical targets and availability of alternative facilities is limited. Additionally, relatively few facilities will be hardened, and the capacity to repair damage will be restricted.[128]

Are these missile systems SUITABLE, "or adapted [for] a use or purpose"[129] in the support of over-the-horizon amphibious assaults? These systems deliver ordnance on target with unparalleled accuracy. For reasons of accuracy and range, "Tomahawk land-attack missiles [and Harpoon(SLAM)] are SUITABLE for employment in three general strike roles: defense suppression, interdiction and surgical strike."[130]

The SUITABLE missions for these weapons are limited only by imagination. To apply the principle of surprise, preemptive attacks might target decisive points such as an adversary's naval assets, fuel and ammunition stockpiles, air-defense facilities, or key logistical infrastructure

sites in an effort to deliver or support a fatal blow.[131] This surprise could be achieved by Tomahawk-capable nuclear submarines able to move covertly and launch their missiles undetected.[132]

As proof of surprise, it must be noted that Tomahawk missiles that struck their targets in Baghdad with as much if not more stealth than their manned one hundred million dollar counterparts, the F-117 Fighters.[133] The performance of these weapons systems during the Gulf War fully demonstrated the FEASIBILITY or "capability"[134] these weapons possess in their ability to deliver ordnance. It is this ability that represents the paramount criterion for the evaluation of any weapons system.[135]

Tomahawk missiles also possess the ability to home on selected active radars,[136] providing the ability to goad an enemy into turning on air-defense radars so anti-radiation Tomahawks can destroy them.[137] Finally, a variant of Tomahawk missiles can attack multiple targets, deploying submunitions at each site. The submunitions can destroy aircraft and soft targets.[138] Thus, it is FEASIBLE for individual Tomahawk missiles to perform the mission of several strike aircraft.

Of great value, then, is the ACCEPTABLE or "satisfactory"[139] manner in which these weapons execute their missions. These missiles may complement the employment of subsequent strike aircraft missions by softening or destroying heavily defended targets and preventing

unnecessary attrition of manned aircraft,[140] thereby preserving the reusable asset. In addition to preserving aircraft sorties, cruise missiles have the ability to attack highly defended targets without endangering pilot's lives. Cruise missiles, due to their pinpoint accuracy (circular error of probabilities between one and ten feet), may attack their target with less collateral damage to nearby civilian installations than may be caused by manned aircraft attack.[141]

Thus, it is more **ACCEPTABLE** to send a cruise missile into danger than an aircraft. Reasonable men demonstrate a natural reluctance to accept unnecessary casualties in one's own forces. This desire to limit casualties extends to the enemy civilian population as well, and is manifested by a desire not to incur public outcry over human rights violations of innocent victims located near military targets.[142] The ex-Deputy Chief of Naval Operations for Surface Warfare eloquently summed up this argument after the Gulf War. He questioned "why is a man still required to bring his airplane to the target, risking his machine and himself, just to line up the sight?"[143] Technology has obviated this requirement of endangering men's lives to deliver ordnance on target. At issue, then, is whether or not it is **AFFORDABLE** to employ these systems in support of over-the-horizon amphibious assault operations.

The **AFFORDABILITY** or ability "to manage or bear [the] cost [of use of these missiles] without serious loss or

detriment"[144] represents one of the best arguments in favor of these uses of the Tomahawk and Harpoon(SLAM) in support of amphibious operations. Some would choose to argue that Tomahawks are expensive weapons and will be scarce when compared to the inventory of iron bombs and non-technologically advanced projectiles.[145] Tomahawks, however, are:

> expensive compared to what? The Tomahawk is usually compared to an iron bomb; [1.2] million dollars versus $55,000. The comparison excludes the launching platform—the airplane, its equally expensive support system, and people. The Navy or Air Force attack aircraft or bomber requires pilots and maintenance crews—people who must be paid, trained, and housed. Several thousand cruise missiles might require no more than a dozen technicians. Furthermore, cruise missiles do not require air bases with commissaries and government quarters.[146]

In terms of dollars, then, the cruise missile represents a bargain. These missiles can protect and conserve valuable reusable assets and generate local air superiority penetrating third-generation integrated air defense systems (IADS).[147] This act would then allow manned aircraft to deliver ordnance on enemy targets with reduced risk, as recently demonstrated.

Just like any expensive asset, however, these missiles:

> should be reserved for those targets worth the cost. The Tomahawk is capable of penetrating sophisticated target defenses and delivering its warhead with precise accuracy. If the "cost" of the mission is driven by expected aircraft attrition rates, or if the air wing is otherwise engaged, then the Tomahawk is an appropriate choice of strike weapon.[148]

A final point concerning AFFORDABILITY of cruise missiles remains the consideration of downed airmen. These prisoners-

of-war become political bargaining chips to their captors as their lives become media currency, as shown during the Vietnam Conflict.[149] The political impact of this issue alone may represent the cost a nation is unable or unwilling to bear in any conflict short of total war. In light of this consideration, cruise missiles in support of future over-the-horizon amphibious assault operations represent an AFFORDABLE and relatively risk-free asset.

One author estimates, however, that in a global war with the Soviets before the year 2000, approximately 600 Tomahawks might be required in support of the Northern NATO area alone.[150] If this estimate is correct, one wonders if the inventory of these weapons will be SUFFICIENT to support a regional conflict of this scale, much less a global scenario. Nevertheless, it remains illogical to "hazard a manned aircraft when a projectile will do the job,"[151] and missile systems have demonstrated the ability to perform strike missions as well if not better than manned aircraft armed with precision munitions.

COMMAND AND CONTROL

Of great concern to commanders and mission planners are the command and control aspects of employing these assets. The Tomahawk mission planning mechanism is part of what must be described as an awkward warfighting system.[152] The most embarrassing aspect of Tomahawk employment remains its planning system. This process is performed in two phases.

Phase one consists of launch and over-water flight planning and is done on the launch platform, requiring minutes to several hours to perform. Phase two planning generates survival routes to the target, includes considerations of terrain avoidance and target defenses, and is done ashore at a theater mission planning center.[153]

Phase two mission planning is a challenge and represents the shortfall in the system. Awkward and complex, it is unresponsive and cannot support battlefield flexibility requirements. An individual mission can take months to prepare if the required terrestrial maps are not available. Under best-case conditions, this process may still require days,[154] due to the requirement for extreme accuracy of data in support of the weapons' precision navigation flight paths. Current phase two mission planning times depend on the amount of precision flight path target data readily available:

> -Digital scenes and maps available = 48 hours.
> -Maps available but no digital scenes = 10-14 days.
> -No maps available = 30 days.[155]

The long lead-time issue, then, becomes the extremely detailed maps required to program the flight data of these weapons' over-land flight profiles. To improve the timeliness of map production, the Navy is procuring the "NAVSTAR" satellite system. This system has an estimated in-service date of 1993. The amount of time in the planning process that NAVSTAR will save remains classified.[156] Thus, planning time remains the limiting factor in Tomahawk

employment. World-wide map coverage in the Tomahawk data base will enhance the situation, but the enormous cost of this project and the time required to generate this data still places a solution to this problem years in the future.

Currently, the Cruise Missile Support Activity maintains the Tomahawk mission repository.[157] This facility maintains an extensive library of pre-planned missions that represent numerous scenario and contingency situations.[158] These pre-planned missions are stored on magnetic discs (DTDs) and are hand-carried to the launch platforms prior to their sailing to sea.[159] Once a mission is loaded into the launch platform's database, existing missions may be modified to facilitate minor changes in target location or missile flight profile.[160] The system is still inflexible, though, as these contingency missions must be anticipated and are not very tailorable to emergent requirements.

TARGET ACQUISITION

Target acquisition has always been a challenge in long-range fire support situations. Historically, target detection and observation of fires were performed by ground-based observers or aerial spotters.

During the Vietnam Conflict, the use of remotely piloted vehicles (RPVs) increased extensively in response to losses of reconnaissance aircraft. Between 1964 and 1965, over 3435 RPV sorties were flown in Southeast Asia.[161] RPVs saved lives and avoided the political ramifications of captured

aircrews.[162] More recently, Israel has successfully utilized RPVs against Soviet-made and Syrian-operated air-defense systems. These RPVs have served in multiple roles including electronic countermeasures, photo-reconnaissance, and deception.[163] Their resolution can approach the accuracy enjoyed by more sophisticated overhead imagery systems at a fraction of the cost.

The Navy started RPV operations after losing several aircraft over Lebanon in 1983. These RPVs were purchased from Israel and were utilized for reconnaissance and naval surface fire support spotting.[164] The Navy currently operates Pioneer RPVs. These platforms have a ceiling of 15,000 feet, travel at speeds up to 70 knots, and have an operating range of 100 nautical miles. Coupled with an endurance of 9 hours, this vehicle is well suited for multiple roles.[165]

This Pioneer system performed well in the Gulf War. These vehicles flew 533 sorties and logged 1,688 flight-hours and ranged up to 75-80 nautical miles from their control stations.[166] Although twelve of these vehicles were lost during the conflict, the manufacturer believes that only two were combat losses.[167] Additionally, these vehicles observed all 16-inch battleship gun firings and were continuously airborne during Desert Storm.[168]

The advantage of the Pioneer RPV system lies in a video data link[169] which provides real-time reconnaissance, fall-of-shot observation and adjustment, and battle damage

assessment.[178] This asset enables commanders to: observe targets from ranges safe at sea; update missile flight paths to reflect verified real-time target location; observe ordnance impact on target; and conduct battle damage assessment in possibly the same sortie. Combined with information from national assets, the commander may maintain a real-time view of a portion of the battlefield.

CONCLUSIONS

The foundations of modern amphibious warfare are traceable to the "classical" and modern theorists. Their thoughts influenced the evolution of amphibious operations to its present form. Modern amphibious warriors applied the theorists' concepts and recognized that an amphibious assault conducted in the old style of attrition warfare is no longer possible. The proliferation of modern acquisition and fire systems to numerous nations, including those in the third-world, has forever changed the conduct of war and necessitated amphibious operation's evolution to incorporate maneuver warfare. This change is reflected in current Marine Corps doctrine and embodied in their concept of over-the-horizon assault.

Historical experience supports this concept. The vulnerability of concentrated amphibious shipping close to enemy shore has represented a lucrative target in the past. The challenges of modern anti-surface, anti-submarine, and anti-air warfare and the difficulties posed by the near-shore

environment are exacerbated by the threat offered by relatively inexpensive shallow-water mines. Thus, the Marine Corps anticipates launching over-the-horizon assaults from approximately fifty nautical miles off the coast. In this variant of amphibious warfare, naval amphibious shipping and surface fire support ships have also been forced seaward and beyond the range of existing conventional gun systems. Therefore, the Navy possesses only two systems, both missiles, to support amphibious over-the-horizon assaults.

As limited as these assets may be, it is possible that Tomahawk and Harpoon(SLAM) can provide sufficient deep fires in support of these assaults. By maximizing the principles of surprise, speed, and the element of shock, the Navy and Marine Corps team can conduct fire support of over-the-horizon assaults. Many difficulties, however, must be overcome to support this evolution.

Sufficient planning time must be allotted by the political and military commanders to allow for the construction of the individual Tomahawk missile missions. Dedicated support of a Theater Cruise Missile Planning Center would greatly assist in this endeavor, but state-side technical assistance is still required to compress the time required to construct these mission packages.

Additionally, depending on the size of the landing, many launch platforms may be required to support the launching of these missions. In this regard, the Navy's principle of

"distributed firepower" will support future assaults. "Cruise missiles distributed among many smaller ships [will] spread the naval strike capability"[171] and distribute the workload among numerous ships, thus reducing the vulnerability of the attack plan should one of the vessels fail to launch its missiles due to battle damage or other casualty. Following establishment of a secure lodgement, the fire support ships could then close the beach to employ their 5-inch guns in close support of the landing or to defeat a counterattack.

For those who doubt the utility of these missile systems, the Secretary of the Navy's assessment of their potential for the future should suffice:

> the effective employment of Tomahawk missiles against Iraq from battleships, attack submarines, cruisers, and destroyers is a precursor of the multi-mission utility we must continue to emphasize in the future.[172]

At issue, however, are the command and control aspects of these missile systems. The time required to plan these missions must be reduced to take advantage of the near real-time nature of emerging surveillance and reconnaissance systems. Additionally, real-time reconnaissance assets must be distributed to fire support capable ships. These RPVs represent cheap assets that deliver big returns on the investment by providing real-time targeting and battle damage assessment. Additionally, they conserve manned aircraft sorties. Perhaps VADM Metcalf, USN(Ret) said it best when he quipped that "the mystique of Top Gun is great, but so was

the romance of the horse cavalry."[173] Just as the inventor Sam Colt said over a hundred years ago, "never send a man where you can send a bullet!"[174] Now that the United States Navy possesses the technology, planners should apply it where it can best contribute, because an obvious lesson of the Gulf War is that technology works,[175] and this trend may well continue. If so, then margin of this advantage may diminish as other countries attempt to exploit the possibilities of emerging smart munitions. The importance of technological consideration in modern warfare is critical. So much so, that if Clausewitz was alive today:

> he would not only be unable to ignore the role of technology in war, but would actually incorporate it into his basic theoretical framework as an important independent force.[176]

IMPLICATIONS

To fully support the concept of over-the-horizon amphibious assault, the United States Navy and Marine Corps team must reexamine all aspects of amphibious warfare. Every supporting arm of amphibious warfare requires redefinition to align them with the realities of technology and its impact on modern combat. A double-edged sword, technological advancement has created as many problems as it has solved.

This advancement has great potential to solve the difficulties posed by over-the-horizon amphibious assault. Improvements in transportation have created the LCAC (Landing Craft Air-Cushioned) and tilt-rotor aviation systems to overcome the time and space difficulties posed by over-the-

horizon distances. In the area of fire support, however, additional application is required to make this supporting arm more responsive. The United States Navy must develop a Tomahawk planning system that allows more flexibility in weapons systems employment than currently available. This system must possess the inherent flexibility to support emergent calls-for-fire in response to changing battlefield conditions. Without that flexibility, this system does not possess the flexibility to support Marine Corps forces ashore "in extremis." Without this ability to respond to short-notice calls for "emergency" fire support, no landing force commander will feel comfortable with the level of support his task force commander can provide.

ENDNOTES

[1] Hermann Kinder and Werner Hilgemann, Atlas of World History: Volume I, From the Stone Age to the Eve of the French Revolution, Trans. by Ernest A. Menze, (New York: Doubleday, 1964), pp. 33-47.

[2] Chalmers Hood, "Amphibious Forces for the Future," Defense and Foreign Affairs, April 1984, p. 18.

[3] Thucydides, History of the Peloponnesian, Trans. by Rex Warner, (New York, NY: Penguin Books), 1972, pg. 270.

[4] LTCOL Ky L. Thompson, USMC, "Mission 2000—Amphibolous or Amphibious?" Marine Corps Gazette, December 1987, p. 35.

[5] Charles E. Myers, Jr., "Littoral Warfare: Back to the Future," USNI Proceedings, November 1990.

[6] MAJ Thomas C. Linn, USMC, "Blitzing the Beach: Over-the-Horizon Assault," Armed Forces Journal International, August 1988, p. 86.

[7] Jeffrey Record, "The Marines and the Amphibious Mission," Amphibious Warfare Review, Summer 1987, p. 59.

[8] William S. Lind, "The Maritime Strategy—1988: Bad Strategy?" USNI Proceedings, February 1988, p. 54.

[9] The Honorable H. Lawrence Garrett, III, Secretary of the Navy, "The Way Ahead," USNI Proceedings, April 1991, pg. 4.

[10] MAJ Harry M. Murdock, USMC, "Doctrine for Combined Airborne and Amphibious Operations," AOSF Monograph, April 1991, p. 1.

[11] The Honorable H. Lawrence Garrett, III, p. 4.

[12] Secretary of the Navy, "Report to the Congress: Fiscal Years 1992-1993," (Alexandria, VA: Navy Internal Relations Activity), 21 February 1991, p. 8.

[13] Andrew Whitehead, "Over the Beach: Amphibious Operations in the 1980s-1990s," NATO's Sixteen Nations, October 1986, pp. 58-59.

[14] COL R. S. Tailyour, RM. "The Future of Amphibious Warfare," RUSI Journal, Spring 1991, p. 37.

[15] Chairman of the Joint Chiefs of Staff, Draft Copy of "National Military Strategy for the 1990s," (Washington DC:

Office of the Chairman, Joint Chiefs of Staff), 22 August 1991, p. 5.

[16] Linn, "Blitzing the Beach," p. 84.

[17] Record, p. 59.

[18] MAJGEN Fred E. Haynes, USMC, "What if There is Never Another Opposed Landing?" Amphibious Warfare Review, Fall 1987, p. 8.

[19] Ibid., pp. 36 and 38; and Secretary of the Navy, "Report to the Congress," pp. 32 and 56.

[20] COL Joseph J. Alexander, USMC(Ret), "The Next Assault Amphibian," USNI Proceedings, November 1989, p. 41.

[21] Sun Tzu, The Art of War, Trans. by Samuel B. Griffith, (New York, NY: Oxford University Press), 1971, p. 11.

[22] Ibid., p. 66.

[23] Ibid., p. 69.

[24] Ibid., p. 98.

[25] Ibid., p. 84.

[26] Ibid., p. 134.

[27] Ibid., p. 85.

[28] Karl von Clausewitz, On War, Eds. and Trans. by Michael Howard and Peter Paret, (Princeton, NJ: Princeton University Press), 1984, p. 359.

[29] Sun Tzu, p. 91.

[30] Ibid., pp. 102-103.

[31] Antoine H. Jomini, Art of War, Ed. by BGEN J. D. Hittr, USMC(Ret) in Roots of Strategy Book 2, (Harrisburg, PA: Stackpole Books), 1987, p. 525.

[32] Ibid., p. 525.

[33] Ibid., p. 526.

[34] Ibid., p. 525.

[35] Ibid., pp. 466-467.

[36] Ibid., pp. 461, 474-475.

[37] Ibid., pp. 494 and 498.

[38] Dr. George Baer, "Under the Influence: Mahan and Sea Power, Corbet and Maritime Strategy," Lecture Notes, Newport, RI: Naval War College, February 1991.

[39] Julian S. Corbett, Some Principles of Maritime Strategy, (Annapolis, MD: Naval Institute Press), 1988, pp. 6 and 15.

[40] Ibid., p. 16.

[41] Ibid., pp. 16 and 17

[42] Ibid., p. 33.

[43] Ibid., p. 35.

[44] Ibid., p. 69.

[45] RADM Conrad C. Lautenbacher, Jr., USN, Presentation Entitled "Naval Expeditionary Forces as an Enabling Force in Joint and Combined Operations," at Boston, MA: Fletcher School of Law and Diplomacy Conference on "Naval Expeditionary Forces and Power Projection: Into the 21st Century," 20 November, 1991.

[46] Corbett, pp. 82-83.

[47] Herbert Rosinski, The Development of Naval Thought, Ed. by B. Michell Simpson, III, (Newport, RI: Naval War College Press), 1977, p. 26.

[48] COL John A. Warden, III, USAF, The Air Campaign: Planning for Combat, (Washington DC: National Defense University Press), 1988, p. 145.

[49] Ibid., p. 13.

[50] Ibid., p. 13.

[51] Ibid., p. 17.

[52] John Aquilino and James Sanders, "Sealift for the Marines," Amphibious Warfare Review, Fall 1988, p. 6.

[53] BGEN C. F. Aspinall-Oglander, Gallipoli: Military Operations, (London: William Heinemann LTD), 1929, p. 58.

[54] John North, Gallipoli: The Fading Vision, (London: Faber and Faber LTD), 1936, p. 52.

[55] Ibid., p. 60.

[56] T. A. Gibson, "Gallipoli, 1915," in Assault from the Sea: Essays on the History of Amphibious Warfare, edited by LTCOL Merrill L. Bartlett, USMC(Ret), (Annapolis, MD: U. S. Naval Institute Press), 1983, p. 149.

[57] Aspinall-Oglander, p. 222.

[58] Army War College, "Official Historical Account of the Dardanelles Campaign by the Turkish General Staff," Trans. from Turkish by CAPT Larcher, French Army, and Trans. from French by CAPT E. M. Beniten, USA, C.A.C.: November, 1925, part III, p. 27.

[59] Aspinall-Oglander, p. 147.

[60] Ibid., pp. 147 and 148.

[61] Ibid., pp. 193 and 282.

[62] Ibid., p. 231.

[63] GEN Sir Ian Hamilton, Gallipolli Diary, (New York, NY: Doran, 1920), p. 135.

[64] Gibson, p. 150.

[65] Aspinall-Oglander, pp. 338-339 and 358.

[66] Ibid., p. 291.

[67] Ibid., p. 297.

[68] Ibid., p. 297.

[69] Ibid., pp. 344-345 and 362.

[70] Philip J. Haythornthwaite, Gallipoli 1915: Frontal Assault on Turkey, (London: Osprey Publishing LTD, 1991), p.64.

[71] Gunther E. Rothenburg, "From Gallipoli to Guadalcanal," in Assault from the Sea: Essays on the History of Amphibious Warfare, edited by LTCOL Merrill L. Bartlett, USMC(Ret), (Annapolis, MD: U. S. Naval Institute Press, 1983), p. 177.

[72] John P. Campbell, "Marines, Aviators, and the Battleship Mentality, 1923-33," in Assault from the Sea: Essays on the History of Amphibious Warfare, edited by LTCOL Merrill L.

Bartlett, USMC(Ret), (Annapolis, MD: U. S. Naval Institute Press, 1983), p. 168-171.

[73] Ibid., p. 179.

[74] Ibid., p. 179.

[75] LGEN Kuribayashi, as quoted by MAJGEN Donald M. Weller, USMC(Ret), "The Development of Naval Gunfire Support in World War Two," in Assault from the Sea: Essays on the History of Amphibious Warfare, edited by LTCOL Merrill L. Bartlett, USMC(Ret), (Annapolis, MD: U. S. Naval Institute Press), 1983, p. 261.

[76] Theodore Roscoe, United States Destroyer Operations in World War II, Ed. by RADM Thomas L. Wattles, USN(Ret), (Annapolis, MD: U. S. Naval Institute Press, 1953), pp. 438-440.

[77] Ibid., p. 460.

[78] Ibid., p. 494.

[79] Aquilino and Sanders, p. 10.

[80] Roscoe, p. 477.

[81] Appleman, Burns, Gugeler, and Stevens, "U. S. Army in World War II, The War in the Pacific, Okinawa: The Last Battle," (Washington, DC: Department of the Army, Office of the Chief of Military History), 1948, p. 473. The losses were as follows:

	Killed	Wounded	Svc Total
Army	4,582	18,099	22,681
Marines	2,938	13,708	16,646
Navy	4,907	4,824	9,731

[82] MAJ Jon T. Hoffman, USMC, "The Future of Forcible Entry," Marine Corps Gazette, April 1991, p. 32.

[83] GEN Douglas MacArthur, USA, as quoted in COL Robert D. Heinl, Jr., USMC(Ret), "Inchon, 1950," in Assault from the Sea: Essays on the History of Amphibious Warfare, edited by LTCOL Merrill L. Bartlett, USMC(Ret), (Annapolis, MD: U. S. Naval Institute Press), 1983, p. 344.

[84] General Douglas MacArthur as quoted in Heinl, p. 346.

[85] General Douglas MacArthur as quoted in Heinl, p. 346.

[86] General Douglas MacArthur as quoted in Scot MacDonald, "Inchon: 'The Impossible Landing'(Part One)," Surface Warfare, October 1981, p. 30.

[87] Scot MacDonald, "Inchon: 'The Impossible Landing'(Part Two)," Surface Warfare, November 1981, p. 19.

[88] Ibid., p. 20.

[89] Ibid., pp. 23-25.

[90] Ibid., p. 26.

[91] Ibid., p. 26

[92] Heinl, p. 352.

[93] Tailyour, p. 34.

[94] Joint Chiefs of Staff, Publication 3-02, Joint Doctrine for Amphibious Operations, (Washington, DC: Departments of the Army, Navy, and the Air Force), 1986, p. 1-3.

[95] Ibid., p. 1-4.

[96] Department of the Navy, Field Manual FMFM 1, Warfighting, (Washington, DC: Headquarters, United States Marine Corps), 1980, pp. 27, 28, and 30.

[97] Ibid., p. 59.

[98] Ibid., p. 59.

[99] LTCOL Jerome F. Bierly, USMC and MAJ Thomas E. Seal, USMC, "Over-the-Horizon Operations," Marine Corps Gazette, July 1991, p. 41.

[100] Steven M. Shaker, "The Character of Future Warfare," Amphibious Warfare Review, Fall/Winter 1990, p. 23.

[101] LTCOL Douglas E. Humston, USMC, "Over-the-Horizon 2000: A Futuristic Concept for the Conduct of Amphibious Operations," Amphibious Warfare Review, Winter 1989, p. 15.

[102] MAJ Thomas C. Linn, USMC, "Blitzing the Beach: Over-the-Horizon Assault," Armed Forces Journal International, August 1988, p. 86.

[103] COL John J. Miller, USMC, "Amphibious Warfare: The Decade of Decision," USNI Proceedings, September 1981, p. 76.

[104] LCDR Carl Douglas, USN, "Amphibious Deficiencies--The Navy's 'Ostrich Acts,'" Marine Corps Gazette, September 1980, p. 43.

[105] Department of the Navy, FMFM 1, p. 59.

[106] Ibid., pp. 59-60.

[107] Ibid., p. 60-61.

[108] Joint Chiefs of Staff, Publication 3-02, p. 7-3.

[109] Ibid., p. 7-4, 7-6, and 7-10.

[110] Ibid., pp. 7-11.

[111] Ibid., p. 16-18.

[112] Ibid., pp. 16-17 , 16-18, and 7-13.

[113] CAPT J. M. Lance, USMC, "Artillery and Maneuver Warfare Can Mix," USNI Proceedings, November 1990, p. 77.

[114] CDR S. J. Froggett, USN, "Tomahawk Has Arrived," USNI Proceedings, December 1985, p. 123.

[115] CDR Carl E. Garrett, Jr., USN, "Telephone Conversation Concerning Naval Surface Fire Support and *DDG 51*-Class Capabilities," (Little Creek, VA: Surface Warfare Development Group), 16 July 1991.

[116] Ibid., Telephone Conversation, 06 November 1991.

[117] CAPT Michael P. Ley, USA, "Naval Gunfire Support: What We Need to Understand," Field Artillery Journal, February 1988, pp. 40-41.

[118] CAPT Matthew P. Bragg, USMCR, "Naval Gunfire: A Status Report," Marine Corps Gazette, December 1990, pp. 17-18.

[119] Department of the Navy, "Report of Fire Control System Mk92 and 76mm/62-Caliber Gun Shore Bombardment," (Norfolk, VA: Commander, Operational Test and Evaluation Force), 24 February 1976, pp. 2-3.

[120] LCDR Curtis L. Orchard, USNR, "A Threat to Which Navy?" USNI Proceedings, April 1984, pp. 146-147.

[121] CDR Jeffery F. Weppler, USN, "Telephone Conversation Concerning *Iowa*-class Battleships and Other Naval Budget Issues," (Washington, DC: OPNAV Staff), 10 October 1991. CDR Weppler stated that the only reason all *Iowa*-class ships are not already out of commission is the desire to have *Missouri* present in Pearl Harbor for the fiftieth anniversary of the attack on Pearl Harbor. She will be decommissioned as soon as possible following the ceremony.

[122] LTCOL S. E. Roberts, USMC, "Point Paper: Long Range Naval Surface Fire Support," (Washington, DC: Headquarters, United States Marine Corps), 19 July 1991, p.1.

[123] Ibid., p. 1.

[124] Merriam and Webster, "Webster's Seventh New Collegiate Dictionary," (Springfield, MA: G. and C. Merriam Company), 1971, p. 564 defines "necessary."

[125] CDR S. J. Froggett, USN, "Tomahawk's Role," USNI Proceedings, February 1987, p. 52.

[126] Merriam and Webster, p. 878 defines "sufficient."

[127] Froggett, "Tomahawk's Role," p. 53.

[128] Michael McGwire, "The Tomahawk and Naval Forces," Cruise Missiles, Technology, Strategy, Politics," Ed. by Richard Betts, (Washington, DC: Brookings Institute), 1981, p. 249.

[129] Merriam and Webster, p. 879 defines "suitable."

[130] Froggett, "Tomahawk's Role," p. 53.

[131] ENS Christopher M. Duquette, USN, "Ban the SLCM," USNI Proceedings, June 1990, p. 36.

[132] Staff of Carrier Group Seven, U. S. Pacific Fleet, "Tomahawk Equals True Value," USNI Proceedings, September 1990, pp. 80-81.

[133] VADM J. Metcalf, III, USN(Ret), "The Last Great Air Battle," USNI Proceedings, March 1991, p. 26.

[134] Merriam and Webster, p. 305 defines "feasible."

[135] LCOL Michael L. Mosbrooker, USA(Ret) and LTCOL John A. Murray, USMC(Ret), "The Naval Gun: Encore! Encore!" USNI Proceedings, July 1983, p. 107.

[136] Staff of Carrier Group Seven, U. S. Pacific Fleet, p. 81.

[137] John E. Ogden, "The Surface Force Renaissance," USNI Proceedings, October 1985, p. 105.

[138] Staff of Carrier Group Seven, U. S. Pacific Fleet, p. 80.

[139] Merriam and Webster, p. 5 defines "acceptable."

[140] Froggett, "Tomahawk Has Arrived," p. 123.

[141] Ogden, p. 106.

[142] Ibid., p. 106.

[143] Metcalf, p. 26.

[144] Merriam and Webster, p. 16.

[145] Froggett, "Tomahawk's Role," p. 53.

[146] Metcalf, p. 26.

[147] Staff of Carrier Group Seven, U. S. Pacific Fleet, p. 80.

[148] Froggett, "Tomahawk's Role," p. 53.

[149] Douglas, p. 48.

[150] MccGwire, p. 249.

[151] William R. Nichols, Jr., "Battleships 1991: An Assessment," USNI Proceedings, June 1991, p. 75.

[152] Metcalf, p. 26.

[153] Froggett, "Tomahawk has Arrived," p. 125.

[154] Ibid., p. 26.

[155] Lt. Mark W. Harris, USN, "Telephone Conversation Concerning Tomahawk Missile Mission Planning Time Considerations," (Fallon, NV: Naval Strike Warfare Center), 08 October 1991.

[156] Ibid., Telephone Conversation, 08 October 1991.

[157] Staff of Carrier Group Seven, U. S. Pacific Fleet, p. 79.

[158] Ibid., pp. 79-80.

[159] Froggett, "Tomahawk Has Arrived," p. 126.

[160] Staff of Carrier Group Seven, U. S. Pacific Fleet, p. 80.

[161] CDR Daniel M. Parker, USN, "The Empty Cockpit," USNI Proceedings, August 1984, p. 41.

[162] Ibid., p. 41.

[163] Ibid., p. 41.

[164] David Lawrence, "From Floatplanes to Unmanned Air Vehicles: *Iowas* Get Pioneers," Amphibious Warfare Review, Fall/Winter 1986, p. 76.

[165] Staff Report, "RPV at Sea," Defense Update International 90, August 1988, p. 21.

[166] Glenn W. Goodman, Jr., "From the Boardroom: Thomas V. Murphy, President and Chief Executive Officer, AAI Corporation (Prime Contractor for the Pioneer RPV)," Armed Forces Journal International, July 1991, p. 32.

[167] Ibid., p. 26.

[168] Ibid., p. 26.

[169] Lawrence, p. 76.

[170] CAPT Timothy B. Howard, USMC, "Unmanned Aerial Vehicles: Where We Were . . . Where We Are . . . Where We're Going," Marine Corps Gazette, October 1990, p. 43.

[171] Howard W. Serig, "The *Iowa* Class: Needed Once Again," USNI Proceedings, May 1982, p. 147.

[172] The Honorable H. Lawrence Garrett, III, p. 8.

[173] Metcalf, p. 26.

[174] Parker, p. 38.

[175] VADM R. F. Dunn, USN(Ret), "Early Gulf War Lessons," USNI Proceedings, March 1991, p. 25.

[176] Michael I. Handel, War, Strategy and Intelligence, (London: Frank Cass and Company Limited), 1989, p. 25.

BIBLIOGRAPHY

GOVERNMENT PUBLICATIONS

Army War College. "Official Historical Account of the Dardanelles Campaign by the Turkish General Staff." Trans. from Turkish by Captain Larcher, French Army; Trans. from French by CAPT E. M Beniten, USA. C.A.C.: November 1925.

Bolmarcich, Joseph S. "Draft of the NNOR Working Group Paper for Naval Gun Ammunition." Wayne, PA: Quantics Incorporated, 18 February 1983.

Burke, James K. "Surface Launched Weaponry Technology Systems Investigations, FY82 Planned Program." Silver Spring, MD: Naval Surface Weapons Center White Oak, 15 June 1981.

Cutchis, Pythagorus. "Comparison of Deployed U. S. and USSR Amphibious Assault Technologies." Alexandria, VA: Institute for Defense Analysis, June 1982.

Department of Defense. "Report of Defense Science Board Task Force on Fire Support for Amphibious Warfare." Washington, DC: Office of the Under Secretary of Defense for Research and Engineering, December 1984.

Department of the Army. Field Manual 6-20, Fire Support in the Airland Battle. Washington, DC: Headquarters, Department of the Army, 1983.

Department of the Army. U. S. Army in World War II. The War in the Pacific. Okinawa: The Last Battle. Washington, DC: Office of the Chief of Military History, 1948.

Department of the Navy. "Report of Fire Control System Mk92 and 76MM/62-Caliber Gun Shore Bombardment." Norfolk, VA: Commander, Operational Test and Evaluation Force, 24 February 1976.

Department of the Navy. Field Manual FMFM 0-3, Doctrinal Publications Guide. Washington, DC: Headquarters, United States Marine Corps, 1980.

Department of the Navy. Field Manual FMFM 1, Warfighting. Washington, DC: Headquarters, United States Marine Corps, 1989.

Department of the Navy. Field Manual FMFM 7-1, Fire Support Coordination. Washington, DC: Headquarters, United States Marine Corps, 1981.

Department of the Navy. Field Manual FMFM 7-2, Naval Gunfire Support. Washington,DC: Headquarters, United States Marine Corps, 1981.

Department of the Navy. "Marine Corps Capabilities Plan." Washington, DC: Headquarters, United States Marine Corps, 31 October 1988.

Department of the Navy. Naval Warfare Publication 22, Doctrine for Amphibious Operations. Washington, DC: Office of the Chief of Naval Operations, 1988.

Department of the Navy. Naval Warfare Publication 22-2(B), Supporting Arms in Amphibious Operations. Washington, DC: Office of the Chief of Naval Operations, June 1990.

Department of the Navy. "The Maritime Strategy." Washington, DC: Office of the Chief of Naval Operations, 23 February 1989.

Joint Chiefs of Staff. Publication 3-02, Joint Doctrine for Amphibious Operations. Washington, DC: Departments of the Army, Navy, and the Air Force, 1986.

Kispert, LTCOL John J., Jr., USMC. "Turning the Tide of the Gunless Sea: An Analysis of Naval Surface Fire Support Requirements for Future Amphibious Operations." Newport, RI: Naval War College, June 1986.

Marine Corps Combat Development Command. "Naval Surface Fire Support Munitions Requirements for Amphibious Operations Study." Quantico, VA: Commanding General, 17 May 1988.

Marine Corps Operations Analysis Group. "Amphibious Assault Fire Support Study (AMFIST)." Alexandria, VA: Center for Naval Analysis, November 1982.

Mezmalis, Andrejs M. "The Major Caliber Lightweight Gun (MCLWG) 8-inch/55 MK71 Mod0 Acquisition Life Cycle." Monterey, CA: Naval Postgraduate School, December 1976.

National Defense University. AFSC Publication 1, The Joint Staff Officer's Guide 1991. Norfolk, VA: Armed Forces Staff College, 1991.

President of the United States. National Security Strategy of the United States. Washington, DC: The White House, August 1991.

Roberts, LTCOL S. E., USMC. "Point Paper: Long Range Naval Surface Fire Support." Washington, DC: Headquarters, United States Marine Corps, 19 July 1991.

Secretary of the Navy. Report to the Congress: Fiscal Years 1992-1993. Alexandria, VA: Navy Internal Relations Activity, February 1991.

Selwyn, P. A. "Department of the Navy Exploratory Development (62) FY 1991 / POM-92 Mission." Arlington, VA: Office of the Chief of Naval Research, 11 May 1990.

Thackeray, Ross S. "Fire Support Requirements Study Phase II Proceedings of the Fire Support Workshop." Arlington, VA: Mathematical and Information Sciences Division, Office of Naval Research, 18 December 1975.

Weller, MAJGEN Donald M., USMC(RET). "Naval Gunfire

Support of Amphibious Operations: Past, Present, and Future." Dahlgren, VA: Naval Surface Weapons Center, October 1977.

BOOKS

Aspinall-Oglander, BGEN C. F. Gallipolli: Military Operations. London: William Heinemann LTD, 1929.

Bartlett, Merrill L. Assault from the Sea. Annapolis, MD: U. S. Naval Institute Press, 1983.

Clausewitz, Karl von. On War, Eds. and Trans. by Michael Howard and Peter Paret. Princeton, NJ: Princeton University Press, 1984.

Corbett, Julian S. Some Principles of Maritime Strategy. Annapolis, MD: U. S. Naval Institute Press, 1988.

Handel, Michael I. War, Strategy, and Intelligence. Totowa, NJ: Frank Cass and Company Limited, 1989.

Haythornthwaite, Philip J. Gallipoli 1915: Frontal Assault on Turkey. Ed. by David G. Chandler. London: Osprey Publishing LTD, 1991.

Hughes, CAPT Wayne P., Jr., USN(RET). Fleet Tactics: Theory and Practice. Annapolis, MD: U. S. Naval Institute Press, 1986.

Jomini, Antoine Henri. Art of War, Ed. By BGEN J. D. Hitter, USMC(RET) in Roots of Strategy Book 2. Harrisburg, PA: Stackpole Books, 1987.

Keegan, John. The Price of Admiralty: The Evolution of Naval Warfare. New York, NY: Penguin Books, 1989.

Kinder, Hermann and Hilgemann, Werner. Atlas of World History: Volume I, From the Stone Age to the Eve of the French Revolution. Trans. by Ernest A. Menze. New York, NY: Doubleday, 1964.

Lehman, John F. Command of the Seas: Building the 600 Ship Navy. New York,NY: Charles Scribner's Sons, 1988.

Mahan, Alfred T. The Influence of Seapower Upon History, 1660-1805. New York, NY: Hill and Wang, Inc., 1957.

Merriam and Webster. Webster's Seventh New Collegiate Dictionary. Springfield, MA: G. and C. Merriam Company, 1971.

Morison, Samuel Eliot. The Two-Ocean War: A Short History of the United States Navy in the Second World War. Boston, MA: Little, Brown, and Company, 1963.

North, John. Gallipoli: The Fading Vision. London: Faber and Faber Limited, 1936.

Potter, E. B., Ed. Sea Power: A Naval History. Annapolis,

MD: U. S. Naval Institute Press, 1981.

Rosinski, Herbert. The Development of Naval Thought, Ed. by B. Mitchell Simpson, III. Newport, RI: Naval War College Press, 1977.

Tzu, Sun. The Art of War, trans. by Samuel B. Griffith. New York,NY: Oxford University Press, 1971.

Thucydides. History of the Peloponnesian War, trans. by Rex Warner. New York, NY: Penguin books, 1972.

Warden, COL John A., III, USAF. The Air Campaign: Planning for Combat. Washington, DC: National Defense University Press, 1988.

PERIODICALS, ARTICLES, MONOGRAPHS, AND THESES

Adler, CDR Ronald E., USN(Ret). "Square Peg? Bum Rap!" USNI Proceedings, April 1984.

Alexander, COL Joseph H., USMC(Ret). "Amphibious Warfare: What Sort of Future?" USNI Proceedings, February 1982.

_____. "The Next Assault Amphibian." USNI Proceedings, November 1989.

Aquilino, John and Sanders, James. "Sealift for the Marines." Amphibious Warfare Review, Fall 1988.

Bailey, MAJ Alfred D., USMC(Ret). "The 16-Incher: Big, Big Gun." USNI Proceedings, January 1983.

Bierly, LTCOL Jerome F., USMC and Seal, MAJ Thomas E., USMC. "Over-the-Horizon Operations." Marine Corps Gazette, July 1991.

Bragg, CAPT Matthew P., USMCR. "Naval Gunfire: A Status Report." Marine Corps Gazette, December 1990.

_____. "Naval Gunfire--A Response." Marine Corps Gazette, February 1991.

Brown, LT Todd H., USN. "Stressing Amphibious Scenarios." Marine Corps Gazette, June 1988.

Cancian, CAPT Mark F., USMC. "Battleships--A Different View." Marine Corps Gazette, February 1982.

Conley, CDR D., RN. "The Impact of Technological Change Upon Naval Policy." RUSI Journal, Summer 1988.

Donko, Wilhelm. "The Naval Gun: Still Relevant in Today's Navy." Defense Update International 80, May-June 1987.

Dotterrer, MAJ David G., USMC. "The Development of Fire Support Coordination for Amphibious Operations Between World Wars I and II." MMAS Thesis, June 1987.

Douglas, LCDR Carl, USN. "Amphibious Deficiencies--The Navy's 'Ostrich Acts.'" Marine Corps Gazette, September 1980.

Dunn, VADM R. F., USN(Ret). "Early Gulf War Lessons." USNI Proceedings, March 1991.

Duquette, ENS Christopher M., USN. "Ban the SLCM." USNI Proceedings, June 1990.

Earl, LTCOL Robert L., USMC. "The Over-the-Horizon Alternatives." Marine Corps Gazette, October 1988.

Eshel, Tamir. "Battleships." Defense Update International 63, 1985.

Fahlstrom, COL Paul G., USMCR(Ret). "Seeing Over the Next Hill." Amphibious Warfare Review, Spring 1988.

_____. "American RPV Acquisition." Amphibious Warfare Review, Summer 1987.

Fickett, Richard K. "Anti-Amphibious Warfare in the 1990s." Amphibious Warfare Review, Summer 1989.

Friedman, Norman. "The Arleigh Burke: A New Breed of Destroyer." International Defense Review 3, 1985.

_____. "Developments in Naval Gunnery." NATO's Sixteen Nations, June 1986.

Froggett, CDR S. J., USN. "Tomahawk Has Arrived." USNI Proceedings, December 1985.

_____. "Tomahawk's Role." USNI Proceedings, February 1987.

Furlong, R. D. M. "U. S. Navy Bringing Back the Battleships?" International Defense Review 6, 1981.

Garrett, the Hon. H. Lawrence, III, Secretary of the Navy. "The Way Ahead." Supplement to Marine Corps Gazette, April 1991.

Geisenheyner, Stefan. "Naval Guns Today." Asian Defence Journal 6, 1984.

Glines, G. "Letter to the Editor." USNI Proceedings, October 1981.

Goodman, Glenn W., Jr. "From the Boardroom: Thomas V. Murphy, President and Chief Executive Officer, AAI Corporation (Prime Contractor for Pioneer UAV)." Armed Forces Journal International, July 1991.

Gray, Colin. "The Maritime Strategy-1988: Global Deterrent?" USNI Proceedings, February 1988.

Greenwood, COL John E., USMC(Ret). "FMFM 1: The Line of Departure." USNI Proceedings, May 1990.

Haines, Steven. "Naval Support for Ground Operations." NATO's Sixteen Nations, November 1987.

Hart, Kerry S. "As If We Had Never Been There." USNI Proceedings, January 1991.

Harvey, LCOL T. H., Jr., USA. "We Lack Enough Naval Gunfire." Marine Corps Gazette, March 1980.

Haynes, MAJGEN Fred E., USMC. "What if There is Never Another Opposed Landing?" Amphibious Warfare Review, Fall 1987.

Hazen, David C. "Nine Prejudices About Future Naval Systems." USNI Proceedings, July 1980.

Hendricks, LTCOL Douglas O., USMC. "U. S. Maritime Strategy in a Post-Cold War World." AOSF Monograph, April 1990.

Herrmann, 2ndLT Fred K., USMC. "Closing the Gun Gap." USNI Proceedings, November 1988.

Hoback, Thomas S. "Nobody Asked Me, But . . . Fix the Frigates." USNI Proceedings, April 1984.

Hoffman, MAJ Jon T., USMC. "The Future of Forcible Entry." Marine Corps Gazette, April 1991.

Hood, Chalmers. "Amphibious Forces for the Future." Defense and Foreign Affairs, April 1984.

Howard, CAPT Timothy B., USMC. "Unmanned Aerial Vehicles: Where We Were . . . Where We Are . . . Where We're Going." Marine Corps Gazette, October 1990.

_____. "Remotely Piloted Vehicle Concepts." Marine Corps Gazette, February 1990.

Hubbard, MAJ Zachary P., USA. "Letter to the Editor." Field Artillery Journal, October 1990.

Humston, LTCOL Douglas E., USMC. "Over the Horizon-2000: A Futuristic Concept for the Conduct of Amphibious Operations." Amphibious Warfare Review, Winter 1989.

Jackson, CAPT John J., USMC. "Supporting the Landing Force." Marine Corps Gazette, June 1988.

Jacobs, G. "Naval Gunfire: Is There a Future?" Asian Defence Journal 6, 1983.

Jaroch, COL Roger M., USMC. "Supporting Land Warfare." USNI Proceedings, November 1988.

Johnson, LT Paul G., USN. "Tomahawk: The Implications of a Strategic/Tactical Mix." USNI Proceedings, April 1982.

Kelly, CAPT John P., USN. "The Achilles' Heel." USNI Proceedings, November 1985.

Kline, LT Jeff, USN. "Firepower from the Sea." Field Artillery Journal, March-April 1985.

Lance, CAPT J. M., USMC. "Artillery and Maneuver Warfare Can Mix." USNI Proceedings, November 1990.

Laurie, E. F. "Sea Control and the Gun." Journal of Defense and Diplomacy 4, April 1986.

Lawrence, David. "From Floatplanes to Unmanned Air Vehicles: *Iowas* Gets Pioneers." Amphibious Warfare Review, Fall/Winter 1986.

Ley, CAPT Michael P., USA. "Naval Gunfire Support: What We Need to Understand." Field Artillery Journal, February, 1988.

Lind, William S. "The Maritime Strategy-1988: Bad Strategy?" USNI Proceedings, February 1988.

Linn, MAJ Thomas C., USMC. "Blitzing the Beach: Over-the-Horizon Assault." Armed Forces Journal International, August 1988.

_____. "Over-the-Horizon Assault: The Future of the Corps." Marine Corps Gazette, December 1987.

Lovece, Joseph A. "UAV Programs Experience Growth Pains." Armed Forces Journal International, July 1991.

Marchant, MAJ Richard J., USA. "*Operational Maneuver and Fires*: A Role for Naval Forces in Land Operations." SAMS Monograph, May 1989.

MacDonald, Scot. "Inchon: 'The Impossible Landing.'" Surface Warfare, October 1981.

McCain, Senator John (R-AZ). "A Maritime Strategy for the 1990's." Sea Power, September 1989.

McCauley, VADM William F., USN. "Today's Amphibious Capability." Marine Corps Gazette, December 1987.

McGwire, Michael. "The Tomahawk and Naval Forces." Cruise Missiles, Technology, Strategy, Politics, Ed. Richard Betts. Washington, DC: Brookings Institute, 1981.

Metcalf, VADM J., III, USN(Ret). "The Last Great Air Battle." USNI Proceedings, March 1991.

Miller, COL John G., USMC. "Amphibious Warfare: The Decade of Decision." USNI Proceedings, September 1981.

_____ and Peterson, MAJ H. W., USMC. "Guns vs. Butter-Without the Guns?" USNI Proceedings, January 1982.

_____. "Letter to the Editor," USNI Proceedings, November 1981.

Moore, CAPT Richard S., USMC. "Blitzkrieg from the Sea: Maneuver Warfare and Amphibious Operations." Naval War College Review, November-December, 1983.

Morgan, GEN Thomas R., USMC. "A Look to the Future." Marine Corps Gazette, December 1987.

Morison, Samuel L. "The Facts Behind the Thunder." USNI Proceedings, August 1981.

Mosbrooker, LCOL Michael L., USA(Ret) and Murray, LTCOL John A., USMC(Ret). "The Naval Gun: Encore! Encore!" USNI Proceedings, July 1983.

Murdock, MAJ Harry M., USMC. "Doctrine for Combined Airborne and Amphibious Operations." AOSF Monograph, April 1991.

Myers, Charles E., Jr. "Littoral Warfare: Back to the Future." USNI Proceedings, November 1990.

Nichols, William R., Jr. "Battleships 1991: An Assessment." USNI Proceedings, June 1991.

Ogden, John E. "The Surface Force Renaissance." USNI Proceedings, October 1985.

Olmstead, LCDR David, USN. "Don't Ban the SLCM." USNI Proceedings, January 1991.

Orchard, LT Curtis L, USNR. "A Threat to Which Navy?" USNI Proceedings, April 1984.

Parker, CDR Daniel M., USN. "The Empty Cockpit." USNI Proceedings, August 1984.

Peniston, CAPT Robert C., USN(Ret). "Battleships: Past, Present, and Future." USNI Proceedings, May 1990.

Pfister, Roger. "New Wine in Old Bottles: Recommissioning of the 'Iowa' Class Battleships." Armada International 5, 1987.

Pierce, LCDR Terry C., USN. "Amphibious Maneuver Warfare." USNI Proceedings, August 1991.

Polmar, Norman. "Battleships and Naval Gunfire Support." Marine Corps Gazette, October 1990.

Preston, Antony. "Amphibious Warfare in the 1990s." Asian Defence Journal 1, 1989.

_____. "Guns from the Sea." Asian Defence Journal 7, 1988.

Prina, L. Edgar. "The Battle for Battleships." Sea Power, September 1981.

Rakow, William M. "MAGTF Operations with the Fleet in the Year 2000." Marine Corps Gazette, July 1990.

Record, Jeffrey. "The Marines and the Amphibious Mission." Amphibious Warfare Review, Summer 1987.

Ryan, Steven. "Giant Killers for the Next Century: The Role of Destroyers in Modern Naval Warfare." Journal of Defense and Diplomacy 6, 1988.

Sartorelli, C. "The 76/62 Super Rapid: A Gun Like No Other, Says OTO Melara." Asian Defence Journal 7, 1988.

Schreiber, CAPT P. K., USMC. "Naval Gunfire: Evolution or Atrophy?" USNI Proceedings, November 1989.

Seaquist, CAPT Larry, USN. "The BBs Are Capital Ships." USNI Proceedings, August 1989.

Seaton, 2NDLT James B., USMC. "NGF Procedures Rusty." Marine Corps Gazette, June 1984.

Serig, Howard W. "The *Iowa* Class: Needed Once Again." USNI Proceedings, May 1982.

_____. "The *Missouri* Returns." USNI Proceedings, July 1986.

Shaker, Steven M. "The Character of Future Warfare." Amphibious Warfare Review, Fall/Winter, 1990

Simmons, BGEN Edwin H., USMC(Ret). "Amphibious Operations." Naval War College Review, March-April 1985.

Simpson, B. M., III. "The Essential Clausewitz." Naval War College Review, March-April 1982.

Staff of Carrier Group Seven, U. S. Pacific Fleet. "Tomahawk Equals True Value." USNI Proceedings, September 1990.

Staff Report. "*Iowa*." USNI Proceedings, July 1984.

Staff Report. "Naval Firepower." Defense and Foreign Affairs, May 1984.

Staff Report. "RPV at Sea." Defense Update International 90, August 1988.

Stillwell, Paul. "Riding Shotgun for the FMF: The Navy Upgrades its Naval Gunfire Support Capabilities." Sea Power, November 1984.

_____. "The Old/New Dreadnoughts." Sea Power, October 1983.

_____. "The Battleship Battle, 1964-1967." Marine Corps Gazette, August 1981.

Summers, COL Harry G., Jr., USA. "Clausewitz and Strategy Today." Naval War College Review, March-April 1983.

Swain, COL Richard M., USA. "'The Hedgehog and the Fox:' Jomini, Clausewitz, and History." Naval War College Review, Autumn 1990.

Tailyour, COL R. S., RM. "The Future of Amphibious Warfare." RUSI Journal, Spring 1991.

Tashjean, John E. "Clausewitz: Naval and Other Considerations." Naval War College Review, May-June 1986.

_____. "The Transatlantic Clausewitz: 1952-1982." Naval War College Review, November-December 1982.

Thompson, LTCOL Ky L., USMC. "Mission 2000—Amphibolous or Amphibious?" Marine Corps Gazette, December 1987.

Thornell, LTCOL John, USMC. "The Expeditionary Task Force." Amphibious Warfare Review, Summer 1990.

Trost, ADM Carlisle A. H., USN. "The Sea Launched Cruise Missile—A Revolutionary Contribution to Naval Warfare." NATO's Sixteen Nations, September 1989.

Truver, Scott C. "The Navy's 'Revolution at Sea': Surface Warfare in the 21st Century." Armed Forces Journal International, November 1987.

_____. "Tomorrow's Fleet." USNI Proceedings, May 1988.

_____. "Whither the Revolution at Sea?" USNI Proceedings, December 1988.

Wheeler, MAJ James R., USMC. "Fire Support for Over-the-Horizon Assault." Marine Corps Gazette, December 1986.

White, Carl. "Naval Gunfire Support." Sea Power, June 1983.

Whitehead, Andrew. "Over the Beach: Amphibious Operations in the 1980s-1990s." NATO's Sixteen Nations, October 1986.

Wood, Colin G. "Riding on the Crest of the Wave—and Staying There: The Bewildering Array of Surface Shipboard Weapons." Armada International 5, 1988.

Yost, David S. "The Most Difficult Question: Controlling Sea-Launched Cruise Missiles." USNI Proceedings, September 1989.

LECTURES, TELEPHONE CONVERSATIONS, AND PRESENTATIONS

Baer, George Dr. "Under the Influence: Mahan and Sea Power, Corbett and Maritime Strategy." Newport, RI: Naval War College, February 1991.

Garrett, CDR Carl E., Jr., USN. Telephone Conversations Concerning "Naval Surface Fire Support and DDG 51 Class

Capabilities." Little Creek, VA: Surface Warfare Development Group, 16 July 1991 and 06 November 1991.

Harris, LT Mark W., USN. Telephone Conversation Concerning "Tomahawk Missile Mission Planning Time Considerations." Fallon, NV: Strike Warfare Center, 08 October 1991.

Lautenbacher, RADM Conrad C., Jr., USN. Presentation Concerning "Naval Expeditionary Forces as an Enabling Force in Joint and Combined Operations." Washington, DC: Director for Force Structure, Resource, and Assessment (J-8), 20 November 1991.